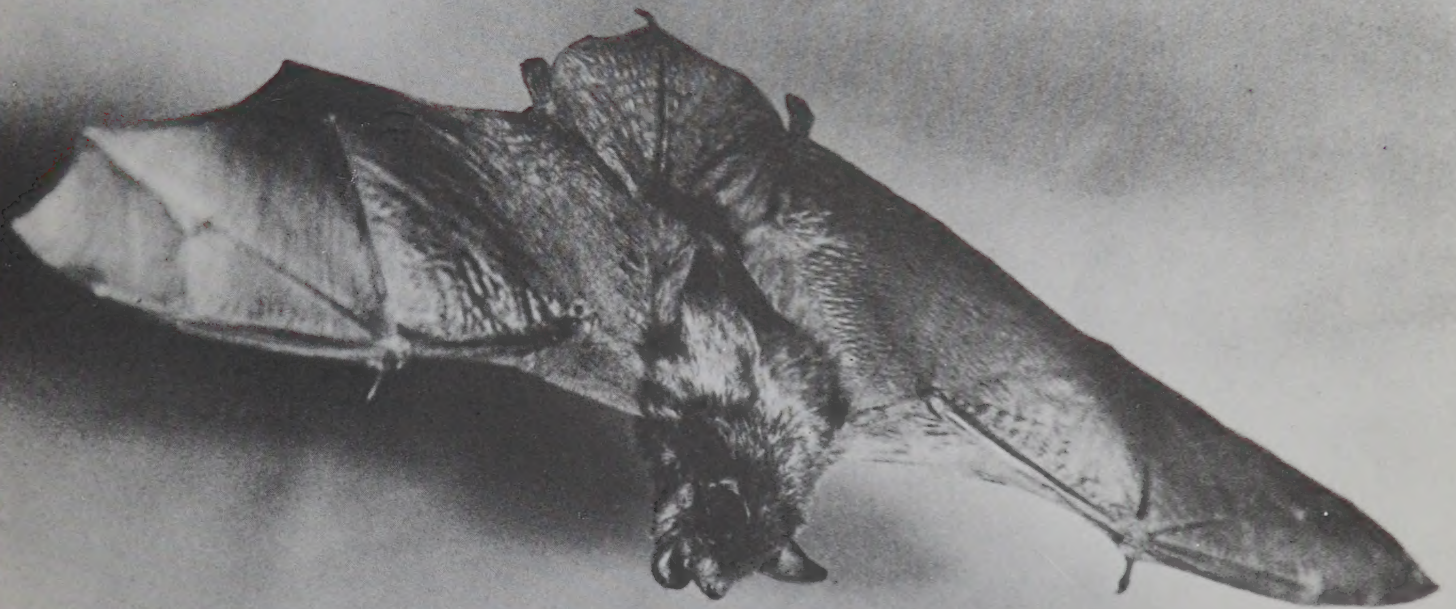


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Bat



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Approximately a dozen species of bats are found in Canada. Like other mammals, they are warm-blooded, give birth to their young and suckle them. They have fur but are unique among mammals in their ability to fly. No other living animal has flight equipment like theirs. It consists of a thin but tough flight membrane that stretches outward from the sides and rear of the body, supported by the arms, legs and tail. It is reinforced by greatly elongated finger bones. When at rest, a bat hangs downward, a position that permits it to start flying by merely releasing its toehold and spreading its wings.

When seen in flight, bats often appear larger than they are. The largest Canadian bat, the hoary bat (*Lasiurus cinereus*), weighs about one and a half ounces, but has a wingspread of about 16 inches. The common little brown bat (*Myotis lucifugus*) weighs approximately one-third of an ounce, but has a wingspread of about 10 inches. For comparison, the weight of a house mouse is about one ounce.

Although bats in the tropics have become specialized for diets of fish, fruit, nectar and even blood, those inhabiting Canada live exclusively on insects, caught while the bat is in flight. These include moths, beetles, mosquitoes and even smaller insects. In the stomach of one little brown bat 145 mosquitoes were found. During a summer one little brown bat would eat 0.3 pounds of insects. In the same period a big brown bat would eat 1.2 pounds of insects.

Birds that catch flying insects do so with their mouths, but bats scoop their victims into the flight membrane, temporarily folded into a pouch, then seize them with their jaws. Although this is a complicated manoeuvre, bats have been observed making two successful catches within one second. Some of the typically erratic flight of bats is the result of such feeding activity.

The eyes of insect-eating bats, which are relatively small, are of little if any use to them in feeding. Some bats locate their prey by echo-

location, which involves the emission of ultrasonic sound and pinpointing the source of the echoes. Since all insect-eating bats use ultrasonic sound to locate their prey, the ability to hear these sounds allows some insects to hear the bats coming and thus avoid being caught. The ability to locate objects by this technique is not widespread, but is employed by some cave-dwelling birds and a few marine animals, such as porpoises.

Canadian bats are divided into two groups on the basis of behaviour. The common species travels relatively short distances between summer and winter quarters. As these bats usually choose caves in which to hibernate, they are known as cave bats. The other species remains active throughout the year, and migrates to warmer climates for the colder months. Unlike the cave bats, which often form colonies in buildings during the summer, these bats normally roost outdoors in trees and shrubs. They are called tree bats.

The map shows the distribution of the little brown bat, the most widely distributed bat in North America. It is a cave bat, and the one whose colonies are most frequently found in buildings. Although tree bats have been captured well north of the limit indicated for the little brown bat, their normal range is within that of the little brown bat. Tree bats are powerful fliers, and stray bats that reach the tundra can survive during its short summer when the tundra abounds with insect life.

Life cycle of the little brown bat

Summer colonies are formed in attics and other dark, hot places. They may consist of as many as several hundred females, which begin arriving early in April. Young are born in June, ordinarily one to each mother. No nest is built, and for several days the young bat, born without noticeable fur, clings with its teeth to its mother, even when she leaves the colony in the evening to feed. As the baby gets larger, it is left behind while the mother hunts. Growth is rapid; within four or five weeks, the baby can fly. Before frost comes it will be full grown and have accumulated enough fat to carry it through the winter. Because few insects can be caught between the time of the first hard frost in the autumn and frost-free days in the spring, its fast may extend from early September until April.

Males remain in the same summer area as the females, but usually do not join the colonies. Most find shelter singly or in small groups under bark, behind shutters, and in other places where the temperature is cooler than in the attic colonies.

When the young have been weaned, bats of both sexes and of all ages scatter about the country-side. Presumably this wandering permits them to find an appropriate place in which to hibernate. They visit a suitable cave briefly, then disperse

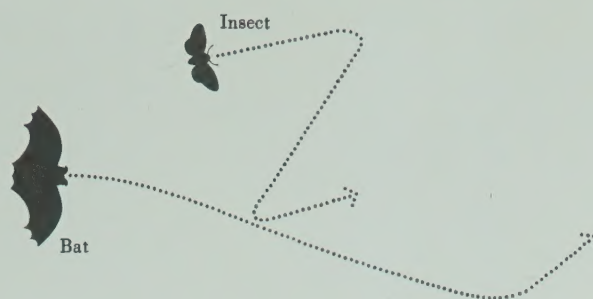
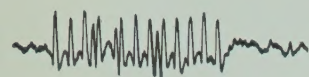


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The flight path of a bat and an insect were photographed using reflected light. This moth has evaded capture by swerving sharply, warned by the sound waves measured on an oscilloscope.



until they return for good in the autumn. Year after year bats return to the summer colony and winter cave. Mating takes place in the autumn, but implantation is delayed until spring, the sex cells remaining alive in the female's reproductive tract through the winter.

Little brown bats hibernate in clusters on the ceiling or higher parts of cave walls, beyond reach of most predators. Often they pack themselves into cracks and pockets in the rock. Their temperature drops to that of the environment, usually from 40° to 50°F, which helps conserve their energy supply — a layer of fat. From time to time they may rouse. It has been noted, for example, that many may cluster near the entrance early in the winter, but that they move farther into the cave as the temperature drops. Moisture may condense in fine droplets at the tips of hairs of hibernating bats, making them look white in a beam of light.

In the spring, females leave the cave before the males. Their activity brings about the discharge of the egg from the ovary, and fertilization takes place. The usual summer colony, a poorly ventilated attic that becomes very hot when the sun shines, is ideal for the embryo, which develops faster at higher temperatures. In the attics, as in the caves, the bats squeeze into crevices or crowd together in clusters. At dusk they emerge, apparently thirsty, for they usually fly at once to water, and drink by skimming the surface. Most colonies of little brown bats are close to rivers, lakes, or ponds, which provide not only water but many of the insects on which they feed.

Although two 24-year-old bats have been reported, their average life span is perhaps but three or four years. Young sometimes get separated from their mothers or are abandoned by them. Others fail to get enough reserve fat to carry them through their first winter. The population of little brown bats in Canada is probably greater today than before the country was settled. The bat finds buildings ideal for summer maternity colonies and abandoned mines quite as acceptable as natural caves for hibernation.

Migration and homing

The distance cave bats travel between the winter quarters and the summer area may be as great as

When at rest a bat hangs downward.



200 miles. The direction of this migration depends on the location of the winter cave. Strangely enough, bats do not always hibernate in the cave nearest to their summer area.

Experiments with the little brown bat have shown that it is a good homer. Even in winter, bats removed from the cave and released at a distance get back successfully.

All tree bats leave Canada in the autumn. It is not certain how far they migrate because their winter range is large, extending from the southern states into Mexico and beyond. During the autumn migration, several have been reported in Bermuda and on ships far out in the Atlantic.

Enemies of bats — control of bats by man

The bat appears to have few enemies. Cats, raccoons, weasels, snakes, owls, and hawks catch some, but man is probably their greatest destroyer today. Bats that get into buildings are killed in large numbers, and many are collected for scientific and public health studies. Unseasonable weather may cause widespread destruction. It is known, for example, that large numbers have perished during migration when caught in heavy rains. Others have died when the entrance to the cave they sought to enter was blocked by snow. Sudden floods sometimes fill caves, drowning the bats, though they seem to recognize caves that flood regularly and avoid hibernating in them.

Although bats play a useful role by helping to keep insects like mosquitoes under control, they are not popular. Their summer colonies are usually not appreciated by humans who share the buildings with them, for bat droppings are smelly.

Getting rid of bats is often difficult. The main passageways can be discovered by watching the building at dusk when the bats emerge to feed. These can be blocked after the bats have left, or during the months when the bats are not in residence. However, bats are not easily discouraged; they exhibit great reluctance to leave their summer home. If passageways are overlooked, the bats will find them, which means further watching and further blocking. In buildings where blocking passageways is impractical, bats can be discouraged by keeping the area where they congregate well lighted day and night. Pesticides are available which will kill bats. However, because of the dangers to man, poison control should be

entrusted to specialists. Fumigation gives only temporary relief; if the quarters remain available, they will be reoccupied.

Bats as carriers of rabies

In 1953 it was first noticed that insect-eating bats can carry the virus of rabies. It is thought that they pick up the virus when they migrate south and come into contact with bats that have a diet of blood. Fortunately, the percentage of infected bats in Canada is low. Some infected bats give no sign of being diseased. Others appear sick and some become aggressive. Because rabies in man is fatal if permitted to develop to the stage where symptoms are observed, bats should be handled only if precautions are taken to prevent them from biting. Children in particular should be warned against handling bats.

If a person is bitten, he should cleanse the wound *at once* and report to a physician. The nearest federal veterinary authorities (Health of Animals Branch, Canada Department of Agriculture) should be alerted *without delay*. The bat should be caught, if possible, for examination at one of the Department's Animal Pathology Laboratories. Delay could result in a human fatality.

Bat banding

Small numbered metal bands, similar to those used on birds, have been employed in studying the migrations and life span of bats. They are issued by the United States Fish and Wildlife Service, Washington, D.C., for the entire continent, and records of all banding are kept by that agency. Few tree bats have been tagged because of the difficulty in catching them, but thousands of cave bats have been banded. Bat banders protect themselves against rabies by receiving inoculations.

Ornithologists who find banded bats report them to the U.S. Fish and Wildlife Service, c/o the National Museum, Washington, D.C. If the bat is dead, the band is removed and sent to Washington along with a note on the date and place of capture. If the bat is uninjured, the number is read carefully and the bat released. Little brown bats cannot bite through rubber gloves, but persons handling larger bats wear leather gloves for safety. The Fish and Wildlife Service notifies the finder of the date and place where the bat was originally banded, and also notifies the bander of its recapture.

Much of the information regarding migrations and life span of bats has come through the co-operation of persons who by chance have found banded specimens and reported them. The longest known migration of the little brown bat is an example. The bat was found in a camp stove in Ontario, 200 miles northwest of the banding site in an old iron mine on the shore of Lake Champlain, in New York.

Most of the popular notions about bats are without foundation. "Blind as a bat" is meaningless,

for bats have eyes and can see. (Vision is thought to be useful to them chiefly in the recognition of distant objects.) Bats do not get in people's hair at least not intentionally. And if a bat does land on a person, it does not shed its parasites. Like man himself, bats do have parasites, but they are so specialized for living on bats that they rarely bother man.

Perhaps the next bat you see will be skimming over the surface of a lake on a summer evening. It may even investigate your lure if you are fly casting. There is no need to be alarmed by it. Because of its hearty appetite for insects it is making your life in the outdoors more enjoyable.

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Issued under the authority of the
Honourable Jack Davis, PC, MP
Minister of the Environment
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Catalogue No. CW 69-4/12
Text: H. B. Hitchcock
Photo: H. E. Edgerton
Design: Gottschalk + Ash Ltd.